NON-PUBLIC?: N
ACCESSION #: 8806140442
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Palo Verde Unit 1 PAGE: 1 of 5

DOCKET NUMBER: 05000528

TITLE: Reactor Trip Due to Test Power Supply Failure
EVENT DATE: 05/12/88 LER #: 88-015-00 REPORT DATE: 06/06/88

OPERATING MODE: 1 POWER LEVEL: 091

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Timothy D. Shriver, Compliance Manager TELEPHONE #: 602-393-2521

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: JC COMPONENT: JX MANUFACTURER: X999
REPORTABLE TO NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: At 1315 MST on May 12, 1988, Palo Verde Unit 1 was in Mode 1 (POWER OPERATION) at approximately 91% power when an automatic actuation of the Reactor (RCT)(AC) Protection System (RPS)(JC) occurred. Surveillance test 36ST-9SB04 (Plant Protective System (PPS)(JC) Functional Test-RPS/Engineered Safety Feature Actuation Systems (ESFAS)(JE)) was in progress when the reactor (RCT)(AC) trip occurred.

Performance of 36ST-9SB04 involves a separate power supply (JX)(JC) utilized only during testing to "hold" the bistable and matrix relays from actuation during the test. The power supply was found to be varying in amplitude intermittently which would cause varying removal and reinstatement of the buck and boost voltage. This caused the trip of the "A" and "D" Reactor Trip Circuit Breakers.

Immediate corrective action was to replace the power supply with a properly operating power supply. A precaution was added to 36ST-9SB04 to ensure that the test performer is aware that the power supply may exhibit instabilities as indicated by lamp "flickering".

(End of Abstract)

I. DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions:

At 1315 MST on May 12, 1988, Palo Verde Unit 1 was in Mode 1 (POWER OPERATION) at approximately 91% power when an automatic actuation of the Reactor Protection System (RPS)(JC) occurred. Surveillance test 36ST-9SB04 (Plant Protective System (PPS)(JC) Functional Test-RPS/Engineered Safety Feature Actuation Systems (ESFAS)(JE)) was in progress when the reactor (RCT)(AC) trip occurred.

B. Reportable Event Description (Including Dates and Approximate Times of Major Occurrences):

Event Classification: Automatic Actuation of the Reactor Protection System

At 1315 MST on May 12, 1988, Palo Verde Unit 1 was operating at approximately 91% power. Instrument and Control Technicians were performing portions of 36ST-9SB04 as a retest prior to declaring channel "C" log power (IG) operable. The log power channel was taken out of service to perform troubleshooting in an attempt to determine why channel "C" did not respond to an increase in neutron flux during plant start-up as did channels "A", "B" and "D".

Reactor Trip Breakers (BKR)(JC) "A" and "D" opened, resulting in a reactor trip. As the Control Element Assemblies (CEA)(AA) fell into the core (AC), the Core Protection Calculators (CPC)(CPU) generated penalty factors due to multiple CEA deviations. These penalty factors were large enough to initiate Low Departure from Nucleate Boiling Ratio (DNBR) trips on all four CPCs. At that point Reactor Trip Breakers "B" and "C" opened. The Assistant Shift Supervisor performed a diagnostic evaluation in accordance with the approved procedure, 41EP-1ZZ01 (Emergency Operations), and diagnosed the event as an uncomplicated reactor trip. The plant was stabilized in Mode 3 (HOT STANDBY) within approximately 5 minutes.

Performance of the matrix relay (RLY)(JC) tests in 36ST-9SB04 involves a separate power supply (JX)(JC) which is utilized only during testing to "hold" the bistable and matrix relays from actuation

during the test. Actuation of the Hold Pushbutton applies a "boost" voltage to the hold coils (CL) of the selected matrix relays. This boost voltage will hold the relays in their energized position during the deactivation of the primary matrix relay coils. The selected parameter bistable trip relays will drop out due to the "buck" voltage applied as the channel trip select switch (HS) is rotated through each of the parameters. The test requires a "boost" voltage to hold the matrix relays during deactivation of the bistable relays and to prevent a matrix initiation. During this event the power supply perturbations caused the boost voltage to become unstable allowing the matrix relays to deenergize resulting in the channel "A" and "D" trip initiation.

During the reenactment of 36ST-9SB04 only one reactor trip breaker, "D", opened. It was determined that this verified the cause of the reactor trip due to the intermittent failure characteristics discovered to be present in the power supply. The power supply was found to be varying in amplitude intermittently which would cause varying removal and reinstatement of the buck and boost voltages. In the trip event, this caused the trip of both "A" and "D" reactor trip circuit breakers. Due to the spurious nature of power supply instabilities, during the reenactment only the "D" breaker opened.

C. Status of structures, systems, or components that were inoperable at the start of the event that contributed to the event:

No other structures, systems, or components were inoperable at the start of the event that contributed to the event other than log power channel "C" as discussed previously.

D. Cause of each component or system failure, if known:

An Engineering Evaluation Request has been initiated to perform a root cause of failure analysis on the power supply.

E. Failure mode, mechanism, and effect of each failed component, if known:

The power supply is utilized during testing only and is not in the circuit during normal operations. The power supply output was varying in amplitude intermittently. This caused the "buck" and "boost" voltages to vary intermittently thereby causing a trip

initiation of the "A" and "D" Reactor Trip Circuit Breakers.

F. For failures of components with multiple functions, list of systems or secondary functions that were also affected:

Not applicable - the power supply does not have multiple functions.



G. For failure that rendered a train of a safety system inoperable, estimated elapsed time from the discovery of the failure until the train was returned to service:

Not applicable - no safety systems were rendered inoperable.

H. Method of discovery of each component or system failure or procedural error:

Troubleshooting in accordance with an approved work control document identified the power supply failure.

I. Cause of Event:

The power supply was found to be varying in amplitude intermittently which would cause varying removal and reinstatement of the buck and boost voltages. This caused the trip of both "A" and "D" Reactor Trip Circuit Breakers.

J. Safety System Response:

Reactor Protection System trip.

There were no other Engineered Safety Feature (ESF)(JE) or RPS actuations and none were required.

K. Failed Component Information:

Manufacturer - Todd Products Corporation
Model Number - SW 12-15

II. ASSESSMENT OF THE SAFETY CONSEQUENCES AND IMPLICATIONS OF THIS EVENT:

As described above, the reactor tripped as designed and all safety responses necessary to place the plant in a stable condition functioned properly. There were no ESF actuations and none were required. Based

on the above, this event had no impact on the health and safety of the public.

III. CORRECTIVE ACTIONS:

A. Immediate:

The faulty power supply was replaced with a properly operating power supply. A precaution was added to 36ST-9SB04 to ensure that the test performer is aware that the power supply may exhibit instabilities as indicated by lamp "flickering".



B. Action to Prevent Recurrence:

Previous indications of potential Todd power supply instabilities has prompted the initiation of a Design Change Package (DCP) to replace Todd power supplies with more reliable power supplies. This DCP was not a result of this event; however, the DCP will be expedited in an attempt to prevent recurrence of this event.

IV. PREVIOUS SIMILAR EVENTS:

No previous similar events have been reported.



Arizona Nuclear Power Project
P.O. BOX 52034 . PHOENIX, ARIZONA 85072-2034

192-00381-JGH/TDS/JEM
June 6, 1988

U. S. Nuclear Regulatory Commission
NRC Document Control Desk
Washington, D.C. 20555

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 1
Docket No. STN 50-528 (License No. NPF-41)
Licensee Event Report 88-015-00
File: 88-020-404

Attached please find Licensee Event Report (LER) No. 88-015-00 prepared and submitted pursuant to 10CFR 50.73. In accordance with 10CFR 50.73(d), we are herewith forwarding a copy of the LER to the Regional Administrator of the Region V office.

If you have any questions, please contact T. D. Shriver, Compliance Manager at (602) 393-2521.

Very truly yours,

/s/ J. G. HAYNES
J. G. Haynes
Vice President
Nuclear Production

JGH/TDS/JEM/kj

Attachment

cc: O. M. DeMichele (all w/a)
E. E. Van Brunt, Jr.
J. B. Martin
T. J. Polich
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INPO Records Center

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